

WE CLAIM:

1. A computerized system comprising:
 - a processing unit;
 - a system memory coupled to the processing unit through a system bus;
 - a computer-readable medium coupled to the processing unit through a system bus;
 - a hierarchical intermediate representation for a heterogeneous program in the system memory;
 - a transformation process executing in the processing unit for modifying the hierarchical intermediate representation to create a modified intermediate representation associated with the heterogeneous program;
 - a dynamic modification process executing in the processing unit; and
 - an application program interface executed from the computer-readable medium by the processing unit, wherein the dynamic modification process calls the application program interface to cause the processing unit to modify the system memory associated with the heterogeneous program running in the system memory based on the modified intermediate representation.
2. The computerized system of Claim 1, wherein the dynamic modification process further calls the application program interface to cause the processing unit to suspend processing of other programs executing in the system memory.
3. The computerized system of Claim 1, wherein the dynamic modification process further calls the application program interface to cause the processing unit to resume processing of the other programs executing in the system memory.
4. The computerized system of Claim 1, wherein modifying the system memory associated with the heterogeneous program causes the processing unit to change execution flow of the heterogeneous program.

5. The computerized system of Claim 1, wherein the heterogeneous program is executing on a remote computing device with a remote system memory, the dynamic modification process calls the application program interface to cause a remote processing unit to modify the remote system memory.

6. The computerized system of Claim 5, wherein the dynamic modification process further calls the application program interface to cause the remote processing unit to suspend processing of other running programs running in the remote system memory.

7. The computerized system of Claim 5, wherein the dynamic modification process further calls the application program interface to cause the remote processing unit to resume processing of the other programs running in the remote system memory.

8. An application program interface embodied on a computer-readable medium for execution on a computer in conjunction with a hierarchical intermediate representation of a heterogeneous program, the application program interface comprising:

- a navigation function that returns program information for a specified computing device;

- a query function that returns information about a program on the specified computing device;

- a thread management function for controlling execution of other programs on the specified computing device; and

- a modifier function for modifying the heterogeneous program residing in a system memory on the specified computing device.

9. The application program interface of Claim 8, wherein the navigation function includes:

- a first program function that returns a first program on the specified computing device.

10. The application program interface of Claim 8, wherein the query function includes a counting function that returns a number representing a count of programs executing on the specified computing device.

11. The application program interface of Claim 8, wherein the thread management function includes:

a suspend function that suspends other programs from executing on the specified computing device; and

a resume function that resumes the execution of the other programs on the specified computing device.

12. The application program interface of Claim 8, wherein the modifier function includes a patch function that overwrites a portion of the system memory originally storing part of the heterogeneous program with a new binary code for the heterogeneous program.

13. The application program interface of Claim 8, wherein the modifier function includes an injector function that writes a new binary code in a portion of the system memory that did not originally store an original binary code for the heterogeneous program, and that writes a jump instruction in a first location of the system memory that stored the original binary code, the new binary code being a modification to the original binary code and the jump instruction transferring execution to the new binary code.

14. The application program interface of Claim 8, wherein the specified computing device is a remote computing device.

15. An application program interface embodied on a computer-readable medium for execution on a computer, the application program interface comprising:

a first set of functions for creating a hierarchical internal representation of a heterogeneous program and for modifying the hierarchical internal representation to create a modified internal representation; and

a second set of functions for dynamically modifying a system memory in which the heterogeneous program is executing, the system memory being modified based on the modified internal representation of the heterogeneous program.

16. The application program interface of Claim 15, wherein the second set further includes functions for controlling processing of other programs executing in the system memory.

17. The application program interface of Claim 15, wherein the second set further includes functions for changing an execution flow of the heterogeneous program.

18. The application program interface of Claim 15, further comprising a third set of functions for modifying a remote system memory if the heterogeneous program is executing in a remote system memory on a remote computer.

19. A computer-readable medium having computer-executable instructions stored thereon to provide an interface to a hierarchical intermediate representation of a heterogeneous program comprising:

an instruction application interface exposed by an instruction element in the hierarchy for navigating, querying, modifying, translating, and committing an instruction in the intermediate representation;

a block application interface exposed by a block element in the hierarchy for navigating, querying, modifying, and committing a block in the intermediate representation;

a procedure application interface exposed by a procedure element in the hierarchy for navigating, querying, modifying, and committing a procedure in the intermediate representation;

a program application interface exposed by a program element in the hierarchy for modifying and querying the intermediate representation for the heterogeneous program; and

a system application interface exposed by a system element in the hierarchy for determining the program element available on a computing device.

20. The computer-readable medium of Claim 1, further comprising a remote application interface for determining the program element when the computing device is a remote computing device.